Automating the Facility Supply Chain

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Texas Technology Showcase
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Outline

• Facility supply chain information problem

• An industry collaboration to solve the problem
Facility Life Cycle

EPCOM

ENVIRONMENT, HEALTH & SAFETY PERFORMANCE
RETURN ON INVESTMENT

INDIRECTS & OTHER
MATERIAL & EQUIPMENT
CONSTRUCTION
COMMISSIONING
STARTUP
OPERATING COSTS
MAINTENANCE COSTS
DECOMMISSIONING COSTS

PHASE DURATIONS / PROJECT CYCLE TIME
TURNAROUND DURATION
OUTAGE DURATION

ASSET RELIABILITY/AVAILABILITY

FACILITY LIFE CYCLE

FACILITY
Facility EPCOM
Supply Chain Issues

- Complex Supply Networks
  - Infinite combinations of suppliers/sub-suppliers
  - Multiple customer/supplier contracting options
- Competitive barriers to integration
  - Proprietary EPC technologies
  - Multiple variations on work processes
- Industry Fragmentation
  - Suppliers support multiple industry groups
  - No clear dominant leaders in any industry group
  - Few clear standards across industry groups
Problem: Software Islands
Problem: Lack of Interoperability

People use many software systems

- Research & Development
- Conceptual Design
- Detailed Engineering
- Construction Contractors
- Detailed Engineering
- Engineering Contractors
- Business planning
- Construction & Start-up
- Operations & Process Control
- Construction Suppliers
- Technical Data over Facility Life Cycle

BUT, information is transferred ON PAPER!
Facilities EPCOM
Information Issues

• Complex Information Sharing
  • Complicated technical/commercial information
  • Multiple incompatible information systems
    • Between customers, suppliers/sub-suppliers
    • Between functional processes, EPC vs O&M

• Competitive barriers to integration
  • Proprietary software systems
  • Competitive business strategies

• Legacy data problems
  • Software versions last 3-5 yrs
  • Facilities last 30-50 yrs
Facility EPCOM Information Exchange

IN A COMPLEX, INFORMATION RICH, TIME CRITICAL, FRAGMENTED, HIGH (INVESTMENT) RISK ENVIRONMENT;

REALTIME, ERROR-FREE, ACTIONABLE, SUPPLY CHAIN INFORMATION EXCHANGE IS CRITICAL
Lack of Interoperability

• NIST auto industry study finding: $1 Billion per year loss

• Construction industry estimates higher cost impact

• Longer cycle times impact schedules

• Electronic data not effectively reused, leveraged or archived
FIATECH
... a collaborative organization to accelerate integration and automation of major capital facilities projects

- Fully Integrated and Automated TECHnology for the capital facilities industry
- Industry-led, collaborative, nonprofit, cooperative research consortium
- Established in July 2000
- Research, development & deployment
- Manage projects aggressively to achieve practical results quickly
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<th>FIATECH Members</th>
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<td>... a mix of Owners, EPCs, Suppliers and Research Organizations</td>
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• **Automating Equipment Information EXchange**
  – Phase 1 August 2002 – February 2003
  – Phase 2 being planned (Meeting: March 27, 2003)
• **ePlantData, Inc.**
  – AEX Project Principal Investigator
  – Provide consulting services to industry
  – Expertise: XML software connectivity and data asset management for capital facilities
Users say: “Can’t we automate this?”

Manual
Total: $N^2 - N$ interfaces
App: $N$ interfaces

Point-to-Point
Total: $N^2 - N$ interfaces
App: $N$ interfaces

The Best Way to Automate Data Exchange
Common-File
Total: $N$ interfaces
App: 1 interface

This is mostly how we do it now!

For $N > 3$, this is too expensive
Equipment work process has 10+

Texas Industries of the Future #14  2003-03-18
Interoperable Future Vision

Data is available to anyone, wherever, and whenever it’s needed.
Benefits of Interoperability

Potential for $1 B annual savings*

- Reduce supply chain work process friction
- Reduce capital costs
- Shorten cycle times
- Reuse data over facility life cycle
- Reduce cost and implementation time for multi-vendor software integration

* To be estimated in current NIST study for the construction industry
Automating Equipment Information Exchange (AEX)

• **Objective:**
  – Enable electronic work processes through improved software interoperability

• **Approach:**
  – Select work processes with major barriers, unique challenges and significant potential benefits
  – Develop incremental, business-driven solutions
  – Practical *deployment in months, not years*
  – Promoting collaboration across industry groups to promote common, broad-industry solutions
AEX Initial Assessment

- **Assessed industry priorities**
  - Engineered equipment
  - Bulk equipment

- **Evaluated available technology**
  - EXtensible Markup Language (XML) is most promising
  - Leverage existing and previous industry efforts
AEX Project Results

- Work process and information flow analysis
- Software usage survey → High value transactions
- Reviewed/incorporated input from related XML efforts
  - Messaging: PIDX, ebXML, OAGIS, BPEL4WS, RosettaNet
  - Subject Schemas: PIDX, PlantData XML, pdXML
- Collaboration with ASHRAE, CII, DIPPR, NIBS O&M, PIDX, PIP, PlantSTEP
- Developing repeatable schema development process
AEX Project Results

• “XML Schema Development Guidelines”
  – GOAL: Consistent XML across multiple industry efforts

• Core reusable XML schemas for multiple disciplines
  – GOAL: Interoperability across multiple industry efforts

• XML schemas for engineered equipment
  – Basic information about all equipment types
    • equipment list exchange scenarios
  – Details for centrifugal pumps and shell & tube exchangers
    • data sheet exchange scenarios
  – Using API and PIP data sheets as input

• XML schemas to support multiple work processes
  – RFQ, Quote, PO, As Manufactured, Equipment List, BOM

• 14 companies participating
AEX Future Focus

• Incorporate industry review feedback
• Publication of current results
• Deployment of current results in software
• Extend XML schemas to additional equipment types
• Explore new opportunity areas:
  – Bulk materials procurement
  – Equipment list scenarios
  – O&M Handover Scenarios
Discussion?
For additional information / discussion, contact

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